



US005991009A

United States Patent [19]

Nishi et al.

[11] Patent Number: 5,991,009

[45] Date of Patent: Nov. 23, 1999

[54] ILLUMINATION OPTICAL APPARATUS
USING DIFFERENT NUMBER OF LIGHT
SOURCES UNDER DIFFERENT EXPOSURE
MODES, METHOD OF OPERATING AND
METHOD OF MANUFACTURING THEREOF

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[21] Appl. No.: 09/127,625

[22] Filed: Aug. 3, 1998

Related U.S. Application Data

[62] Division of application No. 08/921,311, Aug. 29, 1997, Pat.
No. 5,815,248, which is a continuation of application No.
08/636,272, Apr. 29, 1996, abandoned, which is a continuation
of application No. 08/231,159, Apr. 22, 1994, abandoned.

[30] Foreign Application Priority Data

Apr. 22, 1993 [JP] Japan 5-095930
Jun. 11, 1993 [JP] Japan 5-140579
Jun. 16, 1993 [JP] Japan 5-144634

[51] Int. Cl. G03B 27/54
[52] U.S. Cl. 355/70; 355/67; 355/69;
359/619
[58] Field of Search 355/67, 69, 70;
359/619

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[57] ABSTRACT

A diffraction grating is set between a light source and a fly-eye lens composed of a plurality of lens elements rectangular in cross section, and using the zeroth order diffraction beam and ±first order diffraction beams emergent from the diffraction grating, a plurality of light source images are formed along the longitudinal direction on the exit plane of each lens element in the fly-eye lens. In a preferred mode the intensity of illumination light on a mask is increased using first and second light sources, and first illumination beam, which is obtained by combining a beam emitted from the first light source and passing through a half prism with a beam emitted from the second light source and reflected by the half prism on a same axis, and a second illumination beam, which is obtained by combining a beam emitted from the first light source and reflected by the half prism with a beam emitted from the second light source and passing through the half prism on a same axis, are made incident into the fly-eye lens as being inclined symmetrically with each other with respect to the optical axis of illumination optical system.

31 Claims, 12 Drawing Sheets

